

The Model 460 is a reel-to-reel recorder designed to record the outputs of several hydrophone devices while submerged in an oceanographic vehicle. Utilizing modular mechanical and electrical components, the Model 460 is packaged to fit in a 5 inch cylinder. The recorder measures 5" x 5" x 10", weighs 5 pounds and operates from only 5 watts of power.

MODEL 460

UNDERWATER SOUND TAPE RECORDER

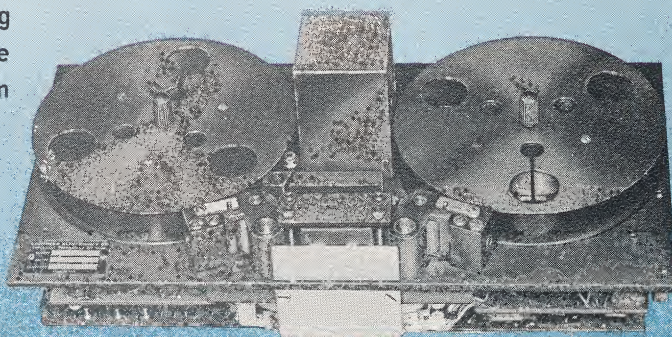
The Model 460 is capable of recording up to 7 tracks of information whose frequency ranges from 10 to 5000 cps. The recorder can be remotely operated at two speeds. Tape capacity of 750 feet provides operation for 30 minutes in the descend mode, 30 minutes in the hover mode and 67 minutes in the ascend mode.

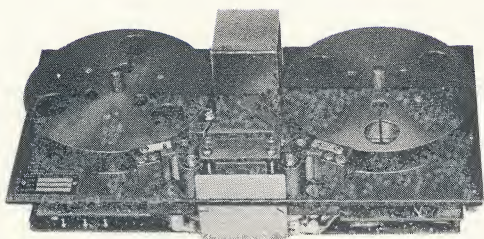
COMPACT

RELIABLE

Primary design importance was attached to the reduction of air-transmitted and directly-transmitted acoustical noise. Designs and components were selected for minimum contribution to the generation of acoustical noise; damping and isolation were used wherever possible. Although final data reduction was to be accomplished on external IRIG-compatible equipment, a preliminary or "confidence" check was provided during rewind, by the use of integral reproduce heads to detect the presence of data on the tape.

**LOW POWER
CONSUMPTION**





SPECIFICATIONS

OPERATIONAL

The Model 460 is typical of the special purpose recorders available with the use of modular recorder components.

Should you require low weight, low power compact recorders for under-sea, shipboard, airborne or space applications, contact Lockheed for prompt reliable information.

- Tape Width 0.5"
- Number of Tracks 7
- Tape Capacity 750 feet
- Frequency Response 10-5000 cps
- Input Level 0.5V RMS
- Input Impedance 10,000 ohms
- Harmonic Distortion Less than 0.9% third harmonic
- Flutter Less than 1% p-p to 500 cps
- Power Consumption Less than 5W
- Tape Speeds
Ascend 15/16 ips
Hover 1-7/8 ips
Rewind 7½ ips
- Recording Time 160 minutes @ 15/16 ips

MECHANICAL

- Size 5" x 5" x 10"
- Weight 5 pounds

ENVIRONMENT

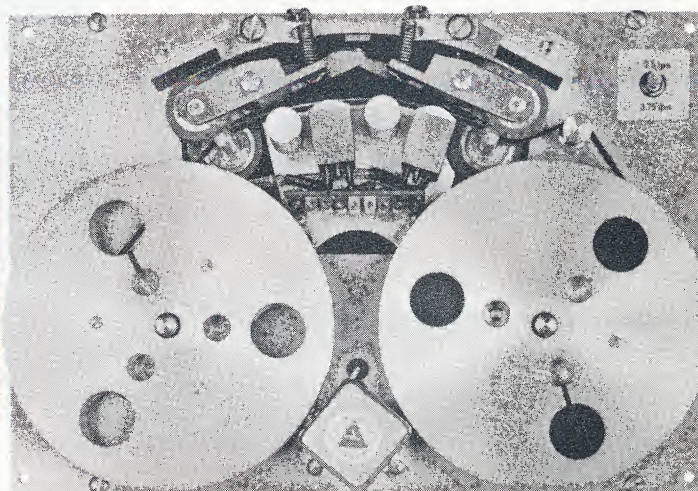
- Temperature 28 to 105°F operating
-50 to 150°F storage
- Relative Humidity To 99% without condensation
- Shock & Vibration Withstands shipboard handling and sea impact

Specifications are subject to change without notice.

MODEL 461

MINIATURE TAPE RECORDER/REPRODUCER

LOW POWER VEHICULAR
RECORDER DESIGNED
FROM PRETESTED STAND-
ARDIZED MODULAR MECH-
ANICAL COMPONENTS.



**ACOUSTICALLY
QUIET**

**IR.I.G.
COMPATABLE**

**COMPACT
LOW POWER**

**PRECISION
TRANSPORT**

The Model 461 tape recorder is designed to minimize airborne and directly-transmitted acoustical noise during operation. Every precaution was taken to choose techniques and mechanical components which make a minimum contribution to the generation of acoustical noise. This recorder was designed for field use and provides the capability of recording up to 7 tracks, either FM or Direct with bandwidths to 2500 and 25000 cps respectively. The recording format is in accordance with IRIG document 106-60, track geometry for 1/2" tape.

The Model 461 weighs 6 pounds, 9 ounces including 750 feet of tape. The total transport volume is 230 cubic inches and power consumption, including separately-packaged electronics is less than 4 watts.

Utilizing a unique miniature low mass differential capstan drive and a phase lock servo system, the recorder provides precision data for reproduction on standard laboratory equipment.

SPECIFICATIONS

OPERATIONAL

- **Tape Widths:** One-half inch.
- **Tracks:**
- **Spacing:** In accordance with IRIG document 106-60.
- **Channels:** 7 FM or direct record.
- **Frequency Response:** FM $7\frac{1}{2}$ ips; 0 to 2.5 kc ± 0.5 db. $3\frac{3}{4}$ ips; 0 to 1.25 kc ± 0.5 db.
- **Signal-To-Noise Ratio:** FM, 41 db (rms/rms over specified pass band).
- **Frequency Response Direct:** $7\frac{1}{2}$ ips; 200 cps to 24 kc. $3\frac{3}{4}$ ips; 200 cps to 12 kc.
- **Signal-to-Noise (direct):** 41 db rms/rms (over specified pass band) referenced to 1,000 cps signal recorded to 1.5% total harmonic distortion (as reproduced on Lockheed Model 417B recorder or equivalent.)
- **Input Level:** 100 millivolts to 2 volts.
- **Harmonic Distortion:** 1.5% for 1 kc signal.
- **Flutter:** 0.75% peak-to-peak (measured from 0 to 5 kc at $7\frac{1}{2}$ ips)
- **Input Impedance:** 20k minimum.
- **Control Logic:** OFF (STOP), RECORD, STANDBY
- **Tape Speeds:** $7\frac{1}{2}$ ips and $3\frac{3}{4}$ ips.
- **Record Time:** 20 minutes at $7\frac{1}{2}$ ips, 40 minutes at $3\frac{3}{4}$ ips.
- **Power Requirements:** 3.84 watts (240 milliamps at 16 volts dc).
- **Speed Stability:** $\pm 0.1\%$ at 70°F. $\pm 0.2\%$ over the specified operating temperature range.

MECHANICAL

- **Size:** $9\frac{3}{4}$ by $6\frac{3}{4}$ by $3\frac{1}{2}$ inches.
- **Weight (With Tape):** 6 pounds 9 ounces.

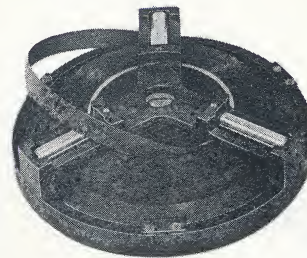
ENVIRONMENTAL

- **Relative Humidity:** 95% without condensation.
- **Temperature:** +20°F to 140°F Operating Temperature Range.
- **Storage:** 50°F to +150°F.
- **Shock and Vibration:** $\frac{1}{2}$ g, 1 cps to 300 cps with flutter not exceeding 1%.
- **Operating Position:** Any position.

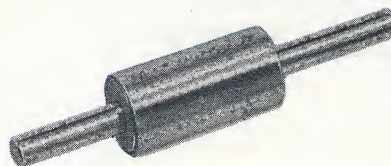
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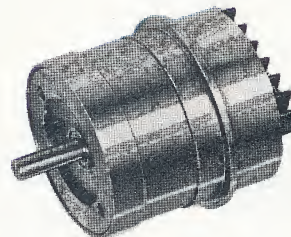
TYPICAL MODULES



CARTRIDGE



BEARING



MOTOR